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EXAMINER

GOSSAGE, GLENN A

ART UNIT	PAPER NUMBER
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2187

DATE MAILED: 10/06/2003

Please find below and/or attached an Office communication concerning this application or proceeding.

Office Action Summary	Application No.	Applicant(s)	
	09/824,083	SADE ET AL.	
	Examiner	Art Unit	
	Glenn Gossage	2187	

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.138(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If the period for reply specified above is less than thirty (30) days, a reply within the statutory minimum of thirty (30) days will be considered timely.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133).
- Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

- 1) ☒ Responsive to communication(s) filed on 11 June 2001.
- 2a) ☐ This action is **FINAL**. 2b) ☒ This action is non-final.
- 3) ☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

- 4) ☒ Claim(s) 1-41 is/are pending in the application.
- 4a) Of the above claim(s) _____ is/are withdrawn from consideration.
- 5) ☐ Claim(s) _____ is/are allowed.
- 6) ☒ Claim(s) 1-41 is/are rejected.
- 7) ☐ Claim(s) _____ is/are objected to.
- 8) ☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

- 9) ☒ The specification is objected to by the Examiner.
- 10) ☒ The drawing(s) filed on 11 June 2001 is/are: a) ☐ accepted or b) ☒ objected to by the Examiner.
 Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).
- 11) ☐ The proposed drawing correction filed on _____ is: a) ☐ approved b) ☐ disapproved by the Examiner.
 If approved, corrected drawings are required in reply to this Office action.
- 12) ☐ The oath or declaration is objected to by the Examiner.

Priority under 35 U.S.C. §§ 119 and 120

- 13) ☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
 a) ☐ All b) ☐ Some * c) ☐ None of:
 1. ☐ Certified copies of the priority documents have been received.
 2. ☐ Certified copies of the priority documents have been received in Application No. _____.
 3. ☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).
 * See the attached detailed Office action for a list of the certified copies not received.
- 14) ☐ Acknowledgment is made of a claim for domestic priority under 35 U.S.C. § 119(e) (to a provisional application).
 a) ☐ The translation of the foreign language provisional application has been received.
- 15) ☒ Acknowledgment is made of a claim for domestic priority under 35 U.S.C. §§ 120 and/or 121.

Attachment(s)

- | | |
|--|---|
| 1) <input checked="" type="checkbox"/> Notice of References Cited (PTO-892) | 4) <input type="checkbox"/> Interview Summary (PTO-413) Paper No(s). _____ |
| 2) <input type="checkbox"/> Notice of Draftsperson's Patent Drawing Review (PTO-948) | 5) <input type="checkbox"/> Notice of Informal Patent Application (PTO-152) |
| 3) <input type="checkbox"/> Information Disclosure Statement(s) (PTO-1449) Paper No(s) _____ | 6) <input type="checkbox"/> Other: |

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1. The title of the invention is not descriptive. A new title is required that is clearly indicative of the invention to which the claims are directed. A new title such as --METHOD, SYSTEM AND COMPUTER PROGRAM PRODUCT FOR MANAGING DATA IN A MIRRORED CACHE USING AN ACCESS BALANCING TECHNIQUE-- is suggested (see claims 1, 18 and 31, lines 1-4 and 7, e.g.). The loss in brevity of title is more than offset by the gain in its informative value in indexing, classifying, searching, etc. See MPEP 606 and 606.01.

2. The abstract of the disclosure is objected to because it does not enable one to quickly determine from a cursory inspection the nature and gist of the technical disclosure as required by 37 CFR 1.72(b). Initially, it appears "Techniques" in line 1 should be changed to --A method, system and computer program product-- for clarity (see claims 1, 18 and 31, line 1, e.g.). In line 2, "included" should be --includes--. In line 5 (page line 6), it appears "are" should be --is-- "one ... is").

Also, one or two sentences should be added describing additionally claimed and disclosed features. [For example, in line 6 (page line 7), after "technique.", insert one or two sentences such as --The access balancing technique may include at least one of selection using round robin and selection based on statistical analysis such as access frequency of the first and second cache memories: First and second access balancing techniques may be used for data accessed from the cache memories, which may comprise disk data and control data, such as data indicating whether

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data in the caches has been modified and is write pending.--. See claims 2-5 and page 9, lines 11-21, for example..]

Appropriate correction is required. See MPEP § 608.01(b).

3. The drawings are objected to because in Figure 1A, as well as Figure 1B, the labels "M1" and "M2" are not adequately clear. Similarly, at least a representative one of the "boxes" 32, 34, 36 and 38 should be descriptively labeled for clarity. [For example, in "boxes" 22 and 24, "M1" and "M2" should be changed to --CACHE-- for clarity. Similarly, a label such as --CONTR.-- or --CTRLR.-- should be placed in "box" 32 for clarity.] Also, it appears the reference numerals "20" and "30" in Figures 1A and 1B, respectively, should be deleted for clarity. [In this regard, also note the objection below with respect to page 6, line 14 and page 17, line 17.]

In Figure 2, the "boxes" 22, 24, 42 and 44 should be descriptively labeled for clarity. [For example, in "boxes" 22 and 24, "M1" and "M2" should be changed to --CACHE-- for clarity. Similarly, a label such as --DISK-- or --DISK STORAGE AREA-- should be placed within "box" 42, and a label such as --HOST-- or --HOST SYSTEM-- placed within "box" 44 for clarity (see page 8, line 2, e.g.).

In Figure 5, the labels within the steps are not entirely clear when read in conjunction with the specification. Within "box" or step 64, it appears --IN BOTH CACHE MEMORIES-- should be inserted after "SAME" for clarity and consistency (note see page 12, lines 13-14). See also

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“diamond” or step 84 in Figures 6, 9 and 10. Similarly, within “diamond” or step 66, it appears “PRIMARY?” should be changed to --IS NON-FAILING CACHE THE PRIMARY STORAGE AREA?-- for clarity and consistency (see page 12 line 21 to page 13, line 1). In “box” or step 68, it appears --DATA-- should be inserted after “MARK” for clarity and consistency (see page 13, lines 4-5, e.g.).

In Figure 7A, the labels within the steps are not entirely clear when read in conjunction with the specification similar to Figure 5. For example, within “box” or step 102, it appears --TO DETERMINE PRIMARY STORAGE AREA-- should be inserted after “TABLE” for clarity and consistency (see page 15, lines 6-7). In “box” or step 104, it appears --FROM DISK-- should be inserted after “COPY” for clarity and consistency (see page 15, lines 8-9). In “box” or step 106, the wording “MARK CONTROL DATA AS IN CACHE” is confusing. It appears “AS” should be --TO INDICATE DATA IS-- for clarity and consistency (see page 15, lines 10-11).

In Figure 7B, the labels within the steps are not entirely clear when read in conjunction with the specification. For example, within “box” or step 112, it appears --BEING MODIFIED-- should be inserted after “BLOCK” for clarity and consistency (see page 16, lines 1-3, e.g.). In “box” or step 114, it appears --FROM PRIMARY-- should be inserted after “SECTOR” for clarity and consistency (see page 16, lines 5-6). In “box” or step 116, the wording “MARK CONTROL DATA AS WRITE PENDING” is confusing. It appears “AS” should be changed to --TO INDICATE DATA-- for clarity.

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In Figure 8, within "box" or step 124, it appears "TWICE" should be changed to --TO BOTH CACHE MEMORIES-- for clarity and consistency (see page 18, line 20, e.g.).

In Figure 14, the "boxes" 22, 24 and 152, as well as 32, 34, 36 and 38 should be descriptively labeled for clarity. [For example, in "boxes" 22 and 24, "M1" and "M2" should be changed to --CACHE-- for clarity. Similarly, a label such as --SPECIALIZED HARDWARE-- should be placed within "box" 152 for clarity. Similarly, a label such as --CONTR.-- or --CTLR.-- should be placed in "box" 32 for clarity.] Also, it appears the reference numeral 150 should be deleted analogous to the reference numerals 20 and 30 in Figures 1A and 1B.

Applicant is REQUIRED to submit a proposed drawing correction in response to this Office action. However, actual formal correction of the noted defect(s) (submission of corrected formal drawings, e.g.) can be deferred until the application is allowed by the examiner.

Also note MPEP 608.02(r) and (v).

4. The drawings are objected to under 37 CFR 1.83(a). The drawings must show every feature of the invention specified in the claims. Therefore, the "first hardware" and "second hardware" (within the "specialized hardware" of claim 25, and the "third hardware" and "fourth hardware" (within the "specialized hardware") of claim 26, must be shown or the feature(s) canceled from the claim(s). No new matter should be entered.

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5. The disclosure has not been checked by the Examiner to the extent necessary to determine the presence of all possible minor errors. Applicant's cooperation is requested in correcting any errors of which applicant may become aware in the disclosure. The following objections are specifically noted:

In the specification:

On page 1, updated information (updated status, if appropriate, e.g.) should be provided for the related application cited in lines 3-4. [For example, in line 4, it appears "(pending)" should be changed to -- , now U.S. Patent No. 6,591,335--.] In line 14, it appears "Vishlizzy" should be --Vishlitzky--.

On page 3, line 8, it appears "thus" should be deleted (note the use of "since" in line 7). In line 14, the wording "In accordance with ... is" is idiomatically awkward and unclear. It appears "is" in line 14 should be changed to --,-- (a comma), and --is described-- inserted after "cache" (first occurrence) in line 15 for clarity.

Similarly, on page 4, it appears "is" in lines 1 and 8 should be changed to --,-- (a comma), and --is described-- inserted after "cache" (first occurrence) in lines 2 and 9 for clarity. In line 17, it appears --cache memory-- should be inserted after "each" for clarity. In line 19, it appears "an other" should be --another--. See also page 12, line 7.

On page 5, lines 10-11, as well as page 6, lines 1-10, the description of the various figures should be differentiated, at least somewhat, for clarity (the description of all six figures is nearly identical although the figures depict somewhat different steps). [For example, on page 5, lines

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10-11, it appears "host accessing data in" should be changed to --read operation executed by the host where data is being read from one or both of-- or other similar language for clarity and consistency (note page 13, lines 19-21, e.g.).]

Similarly, on page 6, line 2, it appears language such as --including obtaining control data based on statistical analysis-- should be inserted after "memories" for clarity. In line 4, it appears language such as --including obtaining control data based on a round robin scheme-- should be inserted after "memories" for clarity. In line 6, it appears language such as --including reading data from another cache-- should be inserted after "memories" for clarity. In line 8, it appears language such as --including reading data based on statistical analysis-- should be inserted after "memories" for clarity. In line 10, it appears language such as --including reading data from cache based on a round robin scheme-- should be inserted after "memories" for clarity. In line 12, it appears "Fig.'s" should be --Figs.--. See also page 19, line 4 and page 21, line 20. In line 14, it appears "20" should be deleted for clarity (it is not entirely clear how Fig. 1A represents a "schematic diagram") and consistency (note page 8, line 17, e.g.).

On page 7, line 17, it appears "30" should be deleted analogous to page 6, line 14.

On page 8, line 1, it appears "40" should be deleted analogous to page 6, line 14 and page 7, line 17. In line 6, it appears "hosts" should be --host-- for clarity and consistency (note line 2, e.g.). In line 9, it appears "device" should be --system-- for consistency (note line 1). In line 19, and throughout the specification, --cache-- should be inserted before "memories" for consistency (note lines 2, 10 and 18, e.g.). See also page 9, lines 18 and 19; page 10, lines 4, 16

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and 17; page 12, line 14 (two occurrences); page 13, lines 14 and 15; page 14, line 14; page 15, lines 7 and 9; and page 16, lines 12, 15 and 20, by way of example only.

On page 9, line 20, "is" appears to read more clearly here as --must be--.

On page 11, lines 1-2, the wording "a write ... to ... the disk storage area 42" is confusing in this context. It appears "portion of the disk storage area 42 corresponding to slot S1" should be changed to --slot 1 portion of the cache memory 24 corresponding to the disk storage area 42-- or other similar language for clarity. In lines 21-22, the wording "while providing a mechanism where write pending cache data is written to both of the cache memories 22, 24" is confusing in this context (the phrase appears to be incomplete).

On page 12, line 9, it appears "5,742,501" should be --5,724,501--.

On page 15, line 1, it appears "that" (second occurrence) should be deleted for clarity. In line 2, it appears "test" (second occurrence) should be deleted for clarity (step 88 is not a test step). In line 7, it appears --by consulting the primary/secondary table-- should be inserted after "data" for clarity and consistency (when the passage is read in conjunction with Fig. 7A). In lines 11-12, it appears "in to" should be --into--. In line 20, it appears "41" should be --42-- (note line 2, as well as Fig. 2).

On page 16, line 7, "is" should be --it--.

On page 17, line 14, it appears --, i.e. if there is a new memory board-- or other similar language should be inserted after "replaced" for clarity and consistency (when the passage is read in conjunction with Fig. 8).

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On page 18, lines 1 and 2, it appears "the cache" should be simply --cache-- for clarity (note that there are two cache memories). In line 12, it appears "the" should be deleted. In line 17, it appears "on" should be --in--.

On page 19, it appears a sentence such as --The connector A' shown in Figure 9 will be discussed in more detail below.-- should be inserted at the end of the paragraph (after "second." in line 18) for clarity. Note page 21, lines 7-18.

On page 20, line 14, it appears "22" should be --86'--.

On page 21, line 19, it appears "150" should be deleted analogous to page 6, line 14; page 7, line 17; and page 8, line 1.

On page 22, line 1, it appears "the cache" should be --a cache-- for clarity. In line 2, the wording "some means (not shown)" is vague and indefinite. In line 4, it appears "caches" should be --cache memories-- for consistency. In line 6, "the queue length" has no proper antecedent and is unclear since no "queue length" appears to have been discussed previously in the specification.

The specification is objected to as failing to provide proper antecedent basis for the claimed subject matter. See 37 CFR 1.75(d)(1) and MPEP § 608.01(o). Correction of the following is required:

The specification does not describe or otherwise provide antecedent basis for any "machine executable code" for implementing the steps or acts as set forth in claims 19-28 and 32-41.

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Again note that these are merely exemplary. The entire specification should be carefully and completely reviewed to ensure that all possible errors are located and corrected.

In the claims:

In claim 1, lines 3 and 4, it appears "of" should be --contained in-- for clarity and consistency (see line 2, as well as claim 18, lines 3-4, e.g.). In line 6, it appears "choosing" should be --selecting-- for clarity and consistency (note the use of "selection" in claim 2, line 2 and claim 3, line 1, and also note claim 18, line 5, e.g.). See also claim 10, lines 2 and 4 and claim 12, line 1. Also, --first and second-- should be inserted before "cache" for consistency (see claim 18, lines 6-7, e.g.). In line 7, it appears "according to" should be --in accordance with-- for consistency (see claim 18, line 7, e.g.).

In claim 2, line 2, as well as claim 3, line 1, it appears "statistics" should be --statistical analysis-- for consistency (see Figures 9 and 12, as well as page 19, lines 11 and 13, e.g.). See also claims ^{line 3 of claims} 9, 11, 23 and 24, line 2.

In claim 3, line 1, it appears --the-- should be inserted before "selection" for clarity.

In claim 4, line 2, it appears "into" should be deleted for consistency (see claim 16, line ³2, e.g.).

In claim 12, line 1, it appears "choosing" should be --the selection of-- for clarity (in conjunction with the changes suggested above for claim 1).

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In claim 14, line 2, the wording "requests from for at least" is not clear. [Should "from for" be changed to --for data from--?]

In claim 18, line 4, it appears "of" should be --included in-- for clarity and consistency (see line 3, e.g.).

In claim 21, line 3, it appears --first and second-- should be inserted before "balancing" for consistency (see line 2).

In claims 23 and 24, line 1, it appears "includes" should be --include-- ("techniques ... include").

In claims 25 and 27, line 1, it appears "further" should be deleted.

In claim 27, line 4, it appears "for" (first occurrence) should be deleted for clarity and consistency (see claim 28, line 4, e.g.).

In claim 29, lines 2 and 4, it appears "in" should be --for--. See also claim 30, lines 1 and 3. Also, it appears "of:" should be simply --of--.

⁸⁴⁰ Claims 31-34 are objected analogous to claims 1-^{4 810}11, respectively, which use similar language.

Also in claim 32, line 3, it appears "further" should be deleted.

In claim 35, line 3, it appears "is" should be deleted.

In claim 37, line 2, it appears "include" should be --includes-- ("code ... includes"). Note claim 39, lines 1-2, e.g.

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Appropriate correction is required.

6. Claims 1-41 are rejected under 35 U.S.C. 112, second paragraph, as being indefinite for failing to particularly point out and distinctly claim the subject matter which applicant regards as the invention.

In claim 1, and therefore its dependent claims, the proper antecedent for “the data” in line 6 is not adequately clear (note the “data” in lines 1, 2, 3 and 5, e.g.).

Similarly, in claims 4 and 16, the proper antecedent for “the data” in line 2 is not entirely clear (again see the “data” in claim 1, lines 1, 2, 3 and 5).

In claim 18, and therefore its dependent claims, the proper antecedent for “the data” in line 7 is not adequately clear analogous to claim 1 (note the “data” in claim 18, lines 1, 2, 3 and 5, e.g.).

Similarly, in claims 19 and 20, the proper antecedent for “the data” (see claim 19, line 5 and claim 20, line 1, e.g.) is not entirely clear (again see the “data” in claim 18, lines 1, 2, 3 and 5, as well as claim 19, line 3). Moreover, it is not entirely clear when the second access balancing technique would be used since the condition (in response to a request for data that is stored in both the first cache memory and the second cache memory” is the same as in claim 18 (see claim 18, lines 5-7).

In claim 22, it is not entirely clear how this claim further limits claim 20 as this limitation would appear to be encompassed within the language of claim 18, lines 5-7 and claim 19, lines 3-

6. [In this regard, also see 37 CFR 1.75(b) and (c) and 35 U.S.C. 112, fourth paragraph.]

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In claim 25, it is not adequately clear to what the "first hardware" and "second hardware," which are within the "specialized hardware," refer in this instance. The terms and phrases used in the claims must find clear support or antecedent basis in the description so that the meaning of the terms in the claims may be ascertainable by reference to the description (in this regard, see also 37 CFR 1.75(d)(1)).

Similarly, in claim 26, it is not adequately clear to what the "first hardware" and "second hardware," which are within the "specialized hardware," refer here.

In claim 30, the proper antecedent for "said first (second) bus" is not clear. [Should the claim depend from claim 29 instead of claim 27?]

Claims 31-41 are unclear analogous to claims 1-11, respectively, which use similar language.

Also in claim 33, the wording "further includes" in line 3 is confusing as the relationship between the computer readable code for choosing and the computer readable code for (at least one of) selection (see claim 32, lines 1-2 and 3) is not clear. [Should "choosing ... further" in claim 33, lines 2-3 be changed to --the selection based on statistics-- or --the selection based on statistical analysis-- for clarity and consistency. Compare the language of claims 2 and 3, e.g.]

In claim 40, "The computer program product, according to claim 9" has no clear antecedent. [Should claim 40 depend from claim 39?]

7. The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

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(a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negated by the manner in which the invention was made.

This application currently names joint inventors. In considering patentability of the claims under 35 U.S.C. 103(a), the examiner presumes that the subject matter of the various claims was commonly owned at the time any inventions covered therein were made absent any evidence to the contrary. Applicant is advised of the obligation under 37 CFR 1.56 to point out the inventor and invention dates of each claim that was not commonly owned at the time a later invention was made in order for the examiner to consider the applicability of 35 U.S.C. 103(c) and potential 35 U.S.C. 102(e), (f) or (g) prior art under 35 U.S.C. 103(a).

Claims 1-2, 4-7, 12-32 and 34-37 are rejected under 35 U.S.C. 103(a) as being unpatentable over Dewey et al in view of Kurokawa et al.

With respect to claim 1, as well as claims 18 and 31, Dewey et al discloses a method and system for managing data in a cache, the system including a first cache memory including data (cache 20 in Figure 1, e.g.) and a second cache memory including data (cache 21), wherein at least some of the data included in the first cache memory is the same as at least some of the data of the second cache memory (see column 5, lines 34-52). However, Dewey et al does not teach providing cache selection hardware for selecting, in response to a request for data that is stored in both the first cache memory and the second cache memory, which one of the first and second

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cache memories to use to obtain the data in accordance with an access balancing technique.

Kurokawa et al discloses a method and system for managing data in a redundant storage configuration, the system including first and second memories (storage devices S0 and S1), wherein at least some of the data of the first cache memory is the same as at least some of the data of the second cache memory (see column 4, lines 34-39 and 54-63, e.g.). Kurokawa et al further teaches, in response to a request for data that is stored in both the first cache memory and the second cache memory, choosing which one of the cache memories to use to obtain the data according to an "access balancing" technique (see column 2, lines 55-67 and column 5, line 67 to column 6, line 4, e.g.) so as to even out or balance accesses between the storage devices. [While Kurokawa et al does not state that the storage devices S0 and S1 are themselves "cache" storage devices, Kurokawa et al teaches that they may include some "cache" storage (see column 9, line 62 to column 10, line 10, e.g.)]

Accordingly, it would have been readily obvious to one of ordinary skill in the art at the time the claimed invention was made to select or choose which one of the memories in Dewey et al to use to obtain data in response to a request for data that is stored in both the first cache memory and the second cache memory, because Kurokawa et al teaches that performance of a data storage system storing redundant data may be improved by evening out or balancing accesses to two (or more) storage devices storing the same data.

Also with respect to claim 31, as well as claims 19 and 21-28, one of ordinary skill in the art would readily recognize that computer related inventions may be implemented in software or

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hardware, and the selective use of software or a "computer program product," or a combination of hardware and software, to implement the method and system of Dewey et al in view of Kurokawa et al as previously discussed, would have been readily obvious to one of ordinary skill in the art at the time the claimed invention was made and, as such, does not render the claimed invention patentably distinct.

With respect to claims 2 and 7, as well as claims 23-24 32 and 37, Kurokawa et al discloses that the access balancing technique may include selection using an interleaving technique so that the memories are alternately accessed. In this manner, the memories may be accessed in a "round robin" manner.

With respect to claim 4, as well as claims 16, 20 and 34, Dewey et al discloses that the data may include "control data" such as status data indicating whether the data is "dirty" or modified, as well as corresponding disk data. Kurokawa et al also teaches storing data indicative of the status the data in the memories.

With respect to claims 5 and 6, as well as claims 35 and 36, access to both the control data and disk data stored in Dewey et al may be balanced in light of the teachings of Kurokawa et al, i.e. the same balancing technique may be used for the control data and disk data.

With respect to claims 12-15 and 17, Kurokawa et al teaches that the selection of the cache memories may utilize circuitry which may be considered to be "specialized" hardware, and that the "specialized" hardware may include at least one chip or integrated circuit (see column 19, lines 48-53, e.g.).

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With respect to claims 29 and 30 (dependent from claim 29?), Dewey et al teaches providing first and second buses (see buses 18A and 18B) coupled to the first and second cache memories and associated controllers, similar to the first and second buses shown in applicants' Figure 1A.

8. Claims 3 and 33 are rejected under 35 U.S.C. 103(a) as being unpatentable over Dewey et al in view of Kurokawa et al as applied to claims 1-2, 4-7, 12-32 and 34-37 above, and further in view of Mason et al.

With respect to claim 3, as well as claim 33, Dewey et al in view of Kurokawa et al discloses a method for managing data in a data storage system including balancing access to first and second cache memories which store common data (see number paragraph 8 above), but does not teach that the access balancing technique is based on statistics including monitoring a number of accesses of the memories over a predetermined amount of time and selecting one of the cache memories based on the access frequencies.

Mason et al similarly discloses a data storage system including a plurality of memories storing mirrored data, and additionally teaches dynamically adjusting a mirror service policy by collecting statistics regarding accesses to the memories over a period of time in order to more evenly balance loading within the storage system (see page 2, lines 23-35 and page 6, lines 5-27, as well as claims 1-3 and 7, e.g.).

Accordingly, it would have been readily obvious to one of ordinary skill in the art at the time the claimed invention was made to provide an access balancing technique in a mirrored

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storage system, which access technique is based on statistics, as taught by Mason et al, in the mirrored storage system of Dewey et al in view of Kurokawa et al, in order to more evenly balance loading the data storage system.

9. The nonstatutory double patenting rejection is based on a judicially created doctrine grounded in public policy (a policy reflected in the statute) so as to prevent the unjustified or improper timewise extension of the "right to exclude" granted by a patent and to prevent possible harassment by multiple assignees. See *In re Goodman*, 11 F.3d 1046, 29 USPQ2d 2010 (Fed. Cir. 1993); *In re Longi*, 759 F.2d 887, 225 USPQ 645 (Fed. Cir. 1985); *In re Van Ornum*, 686 F.2d 937, 214 USPQ 761 (CCPA 1982); *In re Vogel*, 422 F.2d 438, 164 USPQ 619 (CCPA 1970);and, *In re Thorington*, 418 F.2d 528, 163 USPQ 644 (CCPA 1969).

A timely filed terminal disclaimer in compliance with 37 CFR 1.321(c) may be used to overcome an actual or provisional rejection based on a nonstatutory double patenting ground provided the conflicting application or patent is shown to be commonly owned with this application. See 37 CFR 1.130(b).

Effective January 1, 1994, a registered attorney or agent of record may sign a terminal disclaimer. A terminal disclaimer signed by the assignee must fully comply with 37 CFR 3.73(b).

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Claims 1-2, 4-7, 12 -32 and 34-37 are rejected under the judicially created doctrine of obviousness-type double patenting as being unpatentable over claims 1-35 of U.S. Patent No. 6,591,335 or claims 1-19 of U.S. Patent No. 6604,171, each taken separately, in view of Kurokawa et al.

With respect to claim 1, as well as claims 18 and 31, U.S. Patent No. 6,591,335 or U.S. Patent No. 6604,171, each taken separately, discloses a method for managing data in a cache including providing a first cache memory including data and a second cache memory including data, wherein at least some of the data included in the first cache memory is the same as at least some of the data of the second cache memory (see claims 1 and 17 of U.S. Patent 6,591,335 and claims 1, 5 and 14 of U.S. Patent 6,604,171, e.g.), but does not teach providing cache selection hardware for selecting, in response to a request for data that is stored in both the first cache memory and the second cache memory, which one of the first and second cache memories to use to obtain the data in accordance with an access balancing technique.

Kurokawa et al discloses a method and system for managing data in a redundant storage configuration, the system including first and second memories (storage devices S0 and S1), wherein at least some of the data of the first cache memory is the same as at least some of the data of the second cache memory (see column 4, lines 34-39 and 54-63, e.g.). Kurokawa et al further teaches, in response to a request for data that is stored in both the first cache memory and the second cache memory, choosing which one of the cache memories to use to obtain the data according to an "access balancing" technique (see column 2, lines 55-67 and column 5, line 67 to

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column 6, line 4, e.g.) so as to even out or balance accesses between the storage devices. [While Kurokawa et al does not state that the storage devices S0 and S1 are themselves "cache" storage devices, Kurokawa et al teaches that they may include some "cache" storage (see column 9, line 62 to column 10, line 10, e.g.)]

Accordingly, it would have been readily obvious to one of ordinary skill in the art at the time the claimed invention was made to select or choose which one of the memories in U.S. Patent No. 6,591,335 or U.S. Patent No. 6,604,171, each taken separately, to use to obtain data in response to a request for data that is stored in both the first cache memory and the second cache memory, because Kurokawa et al teaches that performance of a data storage system storing redundant data may be improved by evening out or balancing accesses to two (or more) storage devices storing the same data. Since applicants' present claims "read on" the resulting structure and method, the present claims would have been obvious, within the meaning of 35 U.S.C. 103.

Also with respect to claim 31, as well as claims 19 and 21-28, one of ordinary skill in the art would readily recognize that computer related inventions may be implemented in software or hardware, and the selective use of software or a "computer program product," or a combination of hardware and software, to implement the method and system of U.S. Patent No. 6,591,335 or U.S. Patent No. 6,604,171, each taken separately, in view of Kurokawa et al as previously discussed, would have been readily obvious to one of ordinary skill in the art at the time the claimed invention was made and, as such, does not render the claimed invention patentably distinct.

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With respect to claims 2 and 7, as well as claims 23-24 32 and 37, Kurokawa et al discloses that the access balancing technique may include selection using an interleaving technique so that the memories are alternately accessed. In this manner, the memories may be accessed in a "round robin" manner.

With respect to claim 4, as well as claims 16, 20 and 34, U.S. Patent No. 6,591,335 or U.S. Patent No. 6604,171, each taken separately, discloses that the data may include "control data" such as status data indicating whether the data is "dirty" or modified, as well as corresponding disk data (see . Kurokawa et a also teaches storing data indicative of the status the data in the memories.

With respect to claims 5 and 6, as well as claims 35 and 36, access to both the control data and disk data stored in U.S. Patent No. 6,591,335 or U.S. Patent No. 6604,171, each taken separately, may be balanced in light of the teachings of Kurokawa et al, i.e. the same balancing technique may be used for the control data and disk data.

With respect to claims 12-15 and 17, Kurokawa et al teaches that the selection of the cache memories may utilize circuitry which may be considered to be "specialized" hardware, and that the "specialized" hardware may include at least one chip or integrated circuit (see column 19, lines 48-53, e.g.).

With respect to claims 29 and 30 (dependent from claim 29?), the use of first and second buses coupled to the first and second cache memories to obtain separate access to the cache memories in the system of U.S. Patent No. 6,591,335 or U.S. Patent No. 6604,171, each taken

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separately, in view of Kurokawa et al, as discussed above would have been further readily obvious to one of ordinary skill in the art at the time the claimed was made and does not render the claimed invention patentably distinct.

Claims 3 and 33 are rejected under the judicially created doctrine of obviousness-type double patenting as being unpatentable over claims 1-35 of U.S. Patent No. 6,591,335 or claims 1-19 of U.S. Patent No. 6,604,171, each taken separately, in view of Kurokawa et al, as applied to claims 1-2, 4-7, 12-32 and 34-37 above, and further in view of Mason et al.

With respect to claim 3, as well as claim 33, U.S. Patent No. 6,591,335 or U.S. Patent No. 6,604,171, each taken separately, in view of Kurokawa et al, discloses a method for managing data in a data storage system including balancing access to first and second cache memories which store common data (see above), but does not teach that the access balancing technique is based on statistics including monitoring a number of accesses of the memories over a predetermined amount of time and selecting one of the cache memories based on the access frequencies.

Mason et al similarly discloses a data storage system including a plurality of memories storing mirrored data, and additionally teaches dynamically adjusting a mirror service policy by collecting statistics regarding accesses to the memories over a period of time in order to more evenly balance loading within the storage system (see page 2, lines 23-35 and page 6, lines 5-27, as well as claims 1-3 and 7, e.g.).

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Accordingly, it would have been readily obvious to one of ordinary skill in the art at the time the claimed invention was made to provide an access balancing technique in a mirrored storage system, which access technique is based on statistics, as taught by Mason et al, in the mirrored storage system of U.S. Patent No. 6,591,335 or U.S. Patent No. 6604,171, each taken separately, in view of Kurokawa et al, in order to more evenly balance loading the data storage system.

10. 35 U.S.C. 101 reads as follows:

Whoever invents or discovers any new and useful process, machine, manufacture, or composition of matter, or any new and useful improvement thereof, may obtain a patent therefor, subject to the conditions and requirements of this title.

Claims 31-41 are rejected under 35 U.S.C. 101 because the claimed invention is directed to non-statutory subject matter. The claims merely recite a "computer program product" including machine executable code (a program) which is not a statutory class of invention. The specification also does not describe ~~that~~ any "computer program product" stored on a computer readable medium. In this regard, attention is respectfully directed to MPEP 2106 IV.B.1.(a).

11. The prior art made of record and not relied upon is considered pertinent to applicant's disclosure.

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Takahashi et al is cited as disclosing a memory system including first and second cache memories having a plurality of slots, with the cache memories serving as nonvolatile caches for storing dirty or modified data, and wherein use of the cache memories is made in accordance with an access balancing technique similar to the present invention.

Kishi et al is cited as disclosing a data storage system including balanced access to data with redundant copies of data stored in different storage devices similar to the present invention.

Yanai et al, Galtzur et al, Vishlitzky et al and Ofek were cited in the specification (on page 1) as disclosing storage devices containing a plurality of host interface units, disk drives and disk interface units.

Beardsley et al (U.S. '022), Beardsley et al (U.S. '367) and Beardsley et al (U.S. '530) were also cited in the specification (on page 2) as disclosing systems having two clusters which store the same data and have their own cache and nonvolatile storage area.

12. Any inquiry concerning this communication or earlier communications from the examiner should be directed to Glenn Gossage whose telephone number is (703) 305-3820.

Any inquiry of a general nature or relating to the status of this application or proceeding should be directed to the Group receptionist whose telephone number is (703) 305-3900.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Donald Sparks can be reached on (703) 308-1756.

The fax phone numbers for the organization where this application or proceeding is assigned are as follows:

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(703) 746-7238

(After Final Communications)

(703) 746-7239

(Official Communications)

(703) 746-5713

(Use this FAX number only after approval by the Examiner, for "INFORMAL" or "DRAFT" communications. An Examiner may request that a formal paper/amendment be faxed directly to him or her on occasion.)



GLENN GOSSAGE
PRIMARY EXAMINER
ART UNIT 2187